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(54) **ACCESSORY ATTACHMENT SYSTEM FOR AN OSCILLATING POWER TOOL**

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**B25F 5/00** (2006.01)

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B23B 49/003; B25B 23/0064; B25F 5/003;  
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See application file for complete search history.

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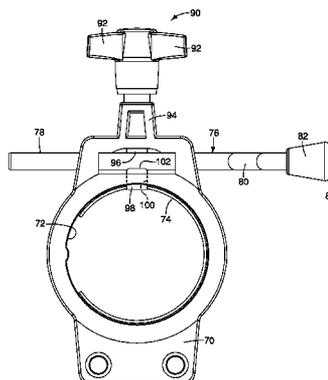
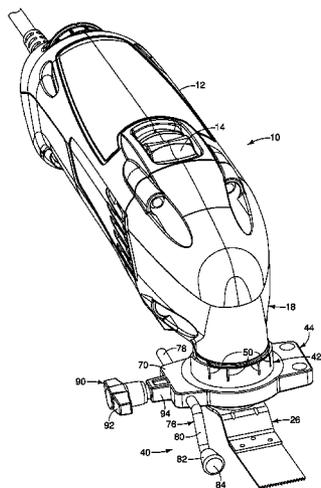
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(57) **ABSTRACT**

An accessory attachment system for a power tool having an elongated housing with a nose portion, an output shaft to which a cutting blade that oscillates through a small angle is attached, the attachment comprising, an accessory interface removably mounted to the nose portion of the housing and a depth guide attachment rotatably mounted to the accessory interface, the depth guide attachment further comprising a relatively thin body portion having a generally circular first opening with a center axis generally parallel to the output shaft, the body portion fitting on the accessory interface and being rotatable thereon and having a second circular opening transverse to the first opening center axis, a depth guide member adjustably mounted on the body portion and having an offset outer end portion, and a locking member configured to secure the depth guide member in a desired position.

**17 Claims, 8 Drawing Sheets**



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**B27B 19/00** (2006.01)  
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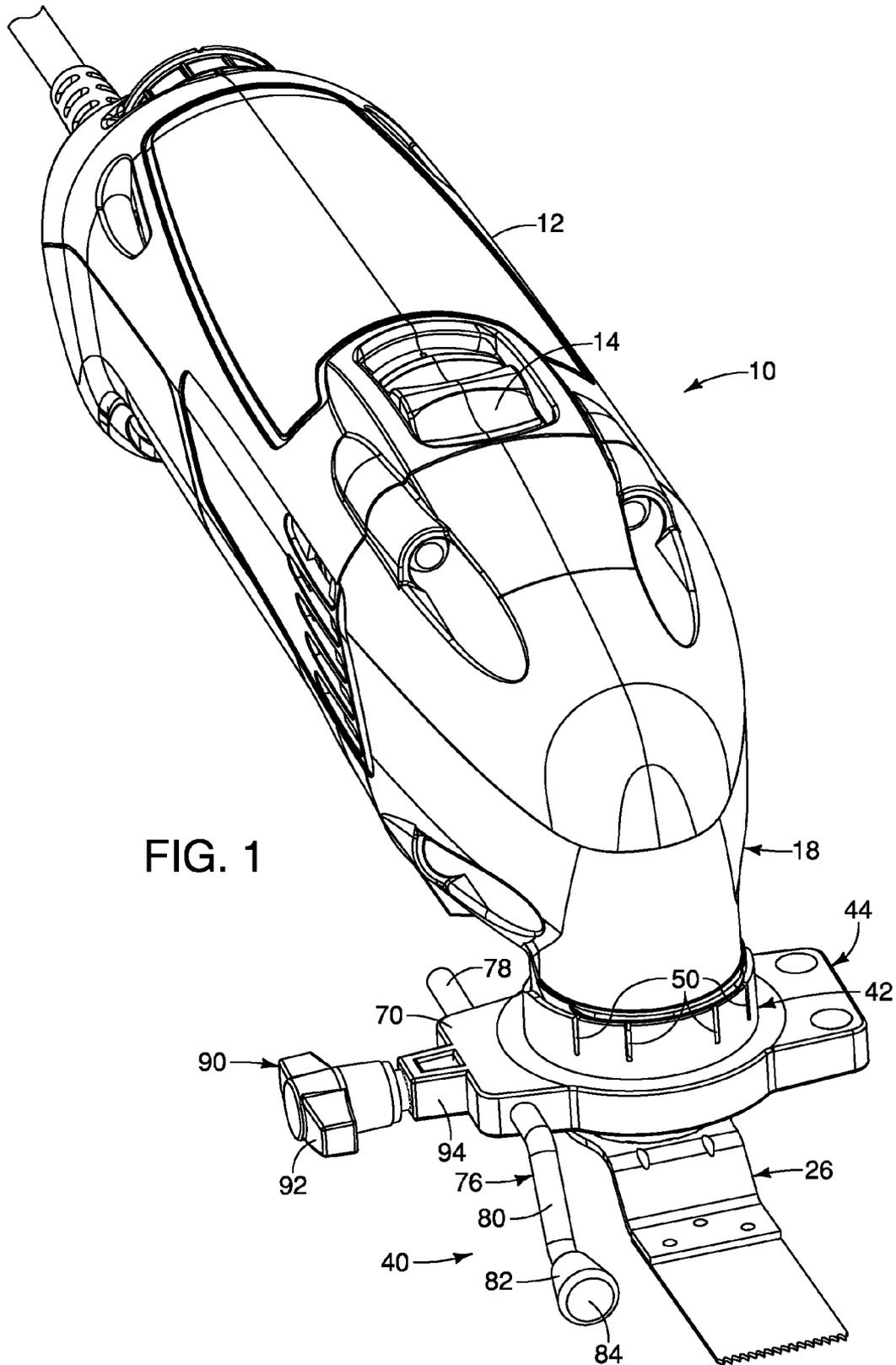
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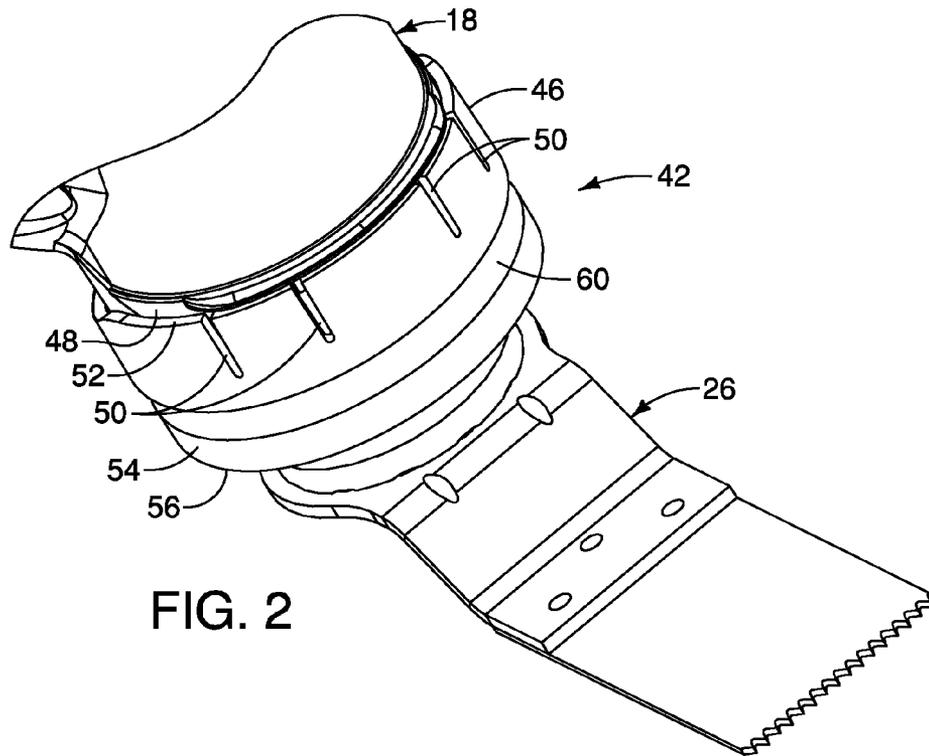


FIG. 2

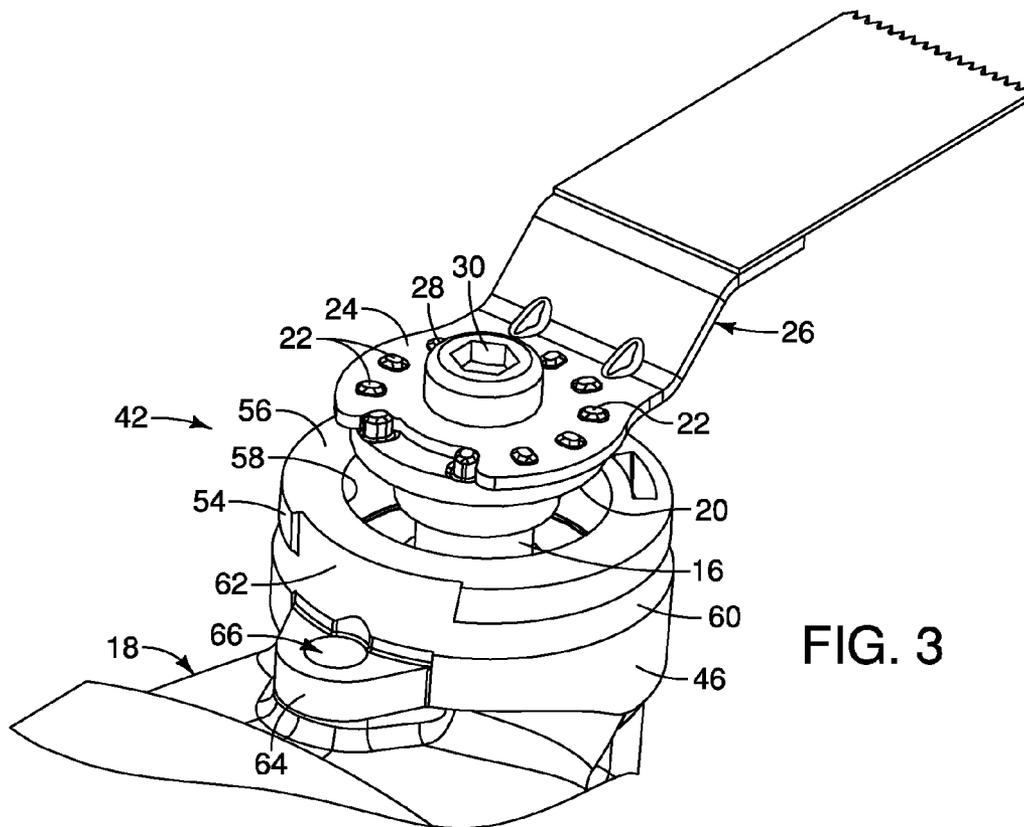
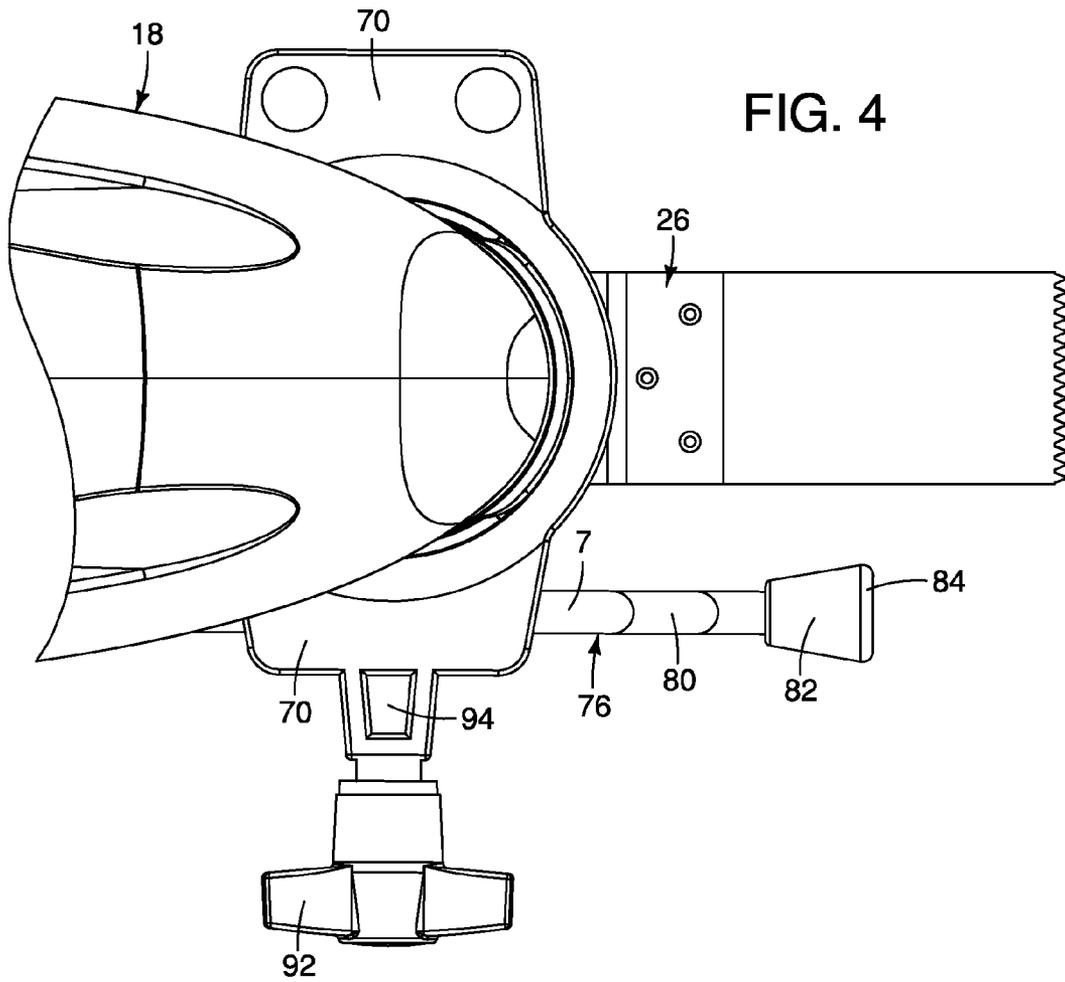


FIG. 3



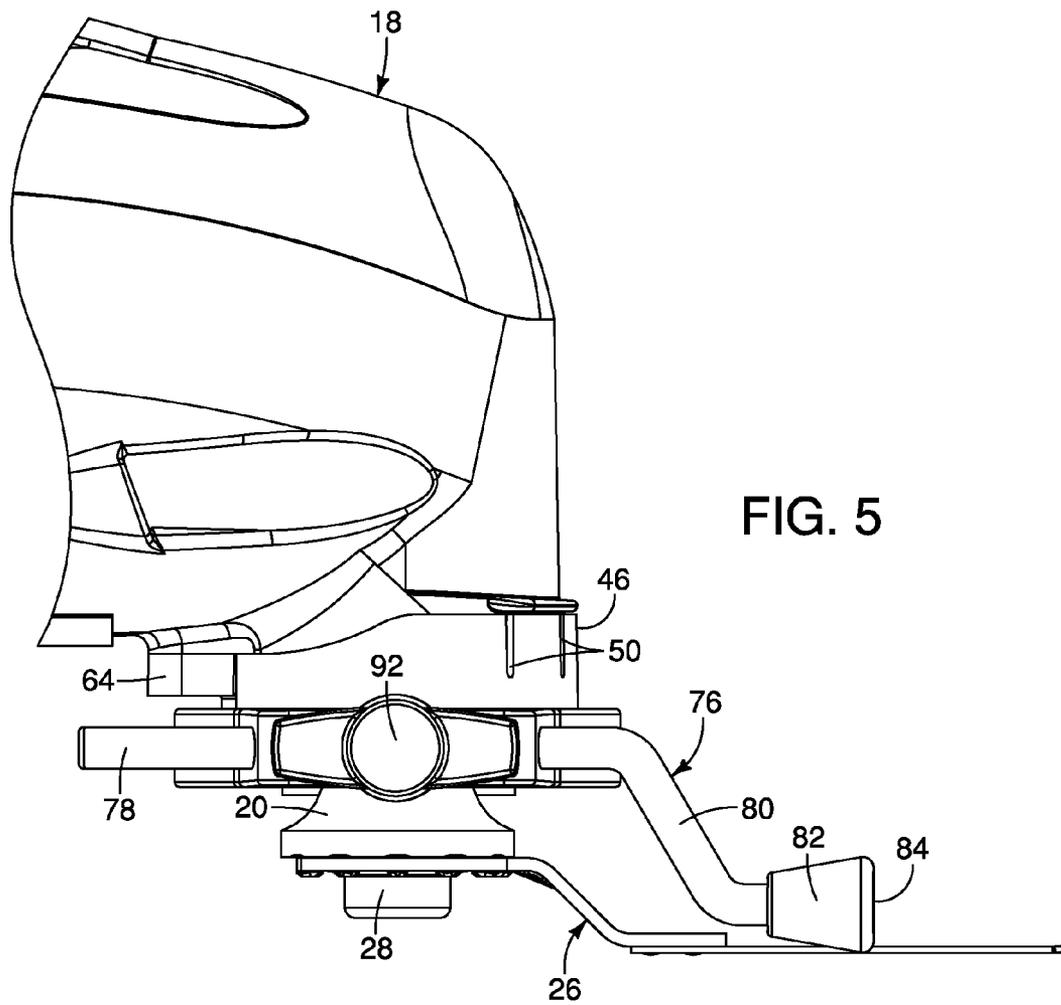
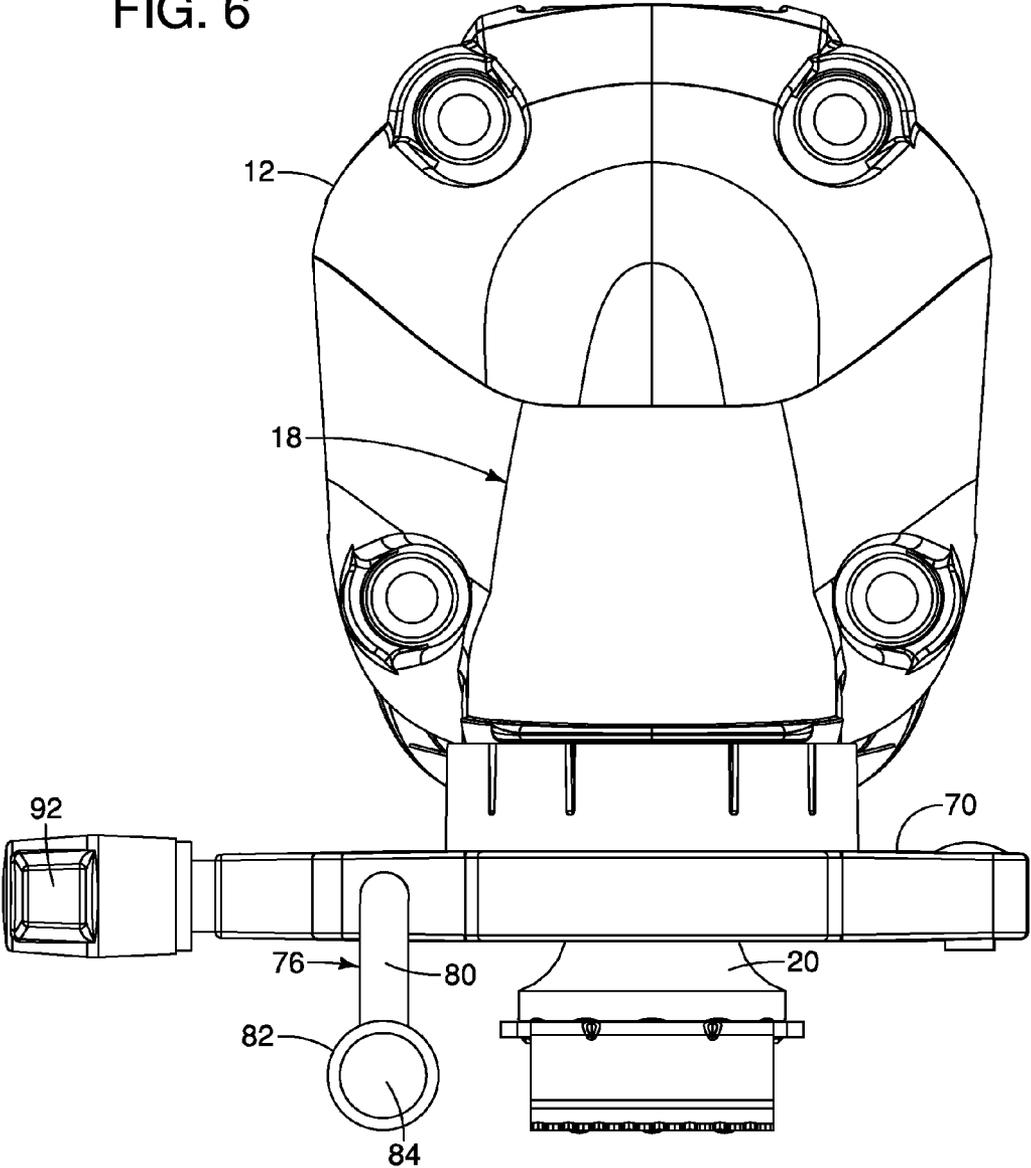


FIG. 6



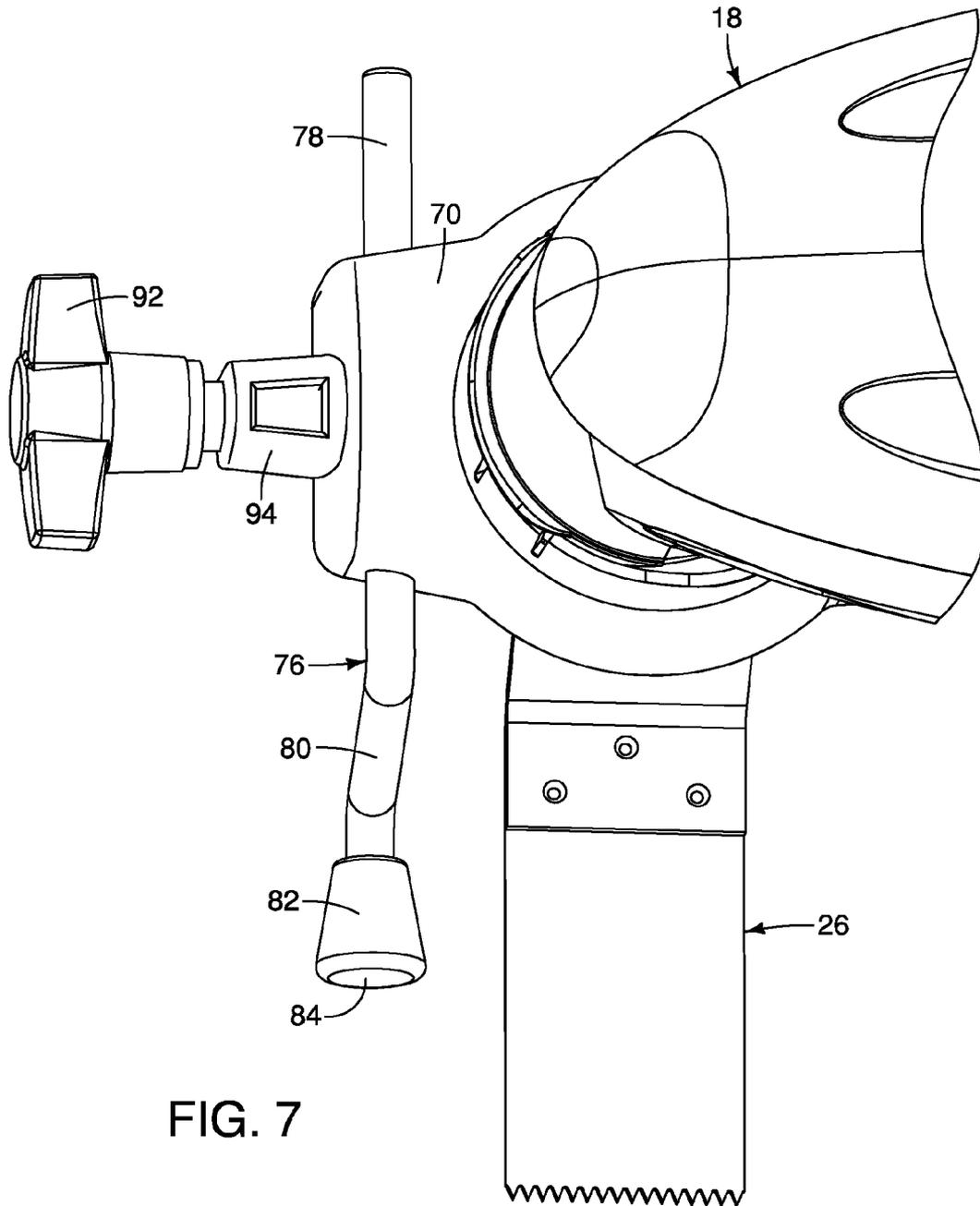
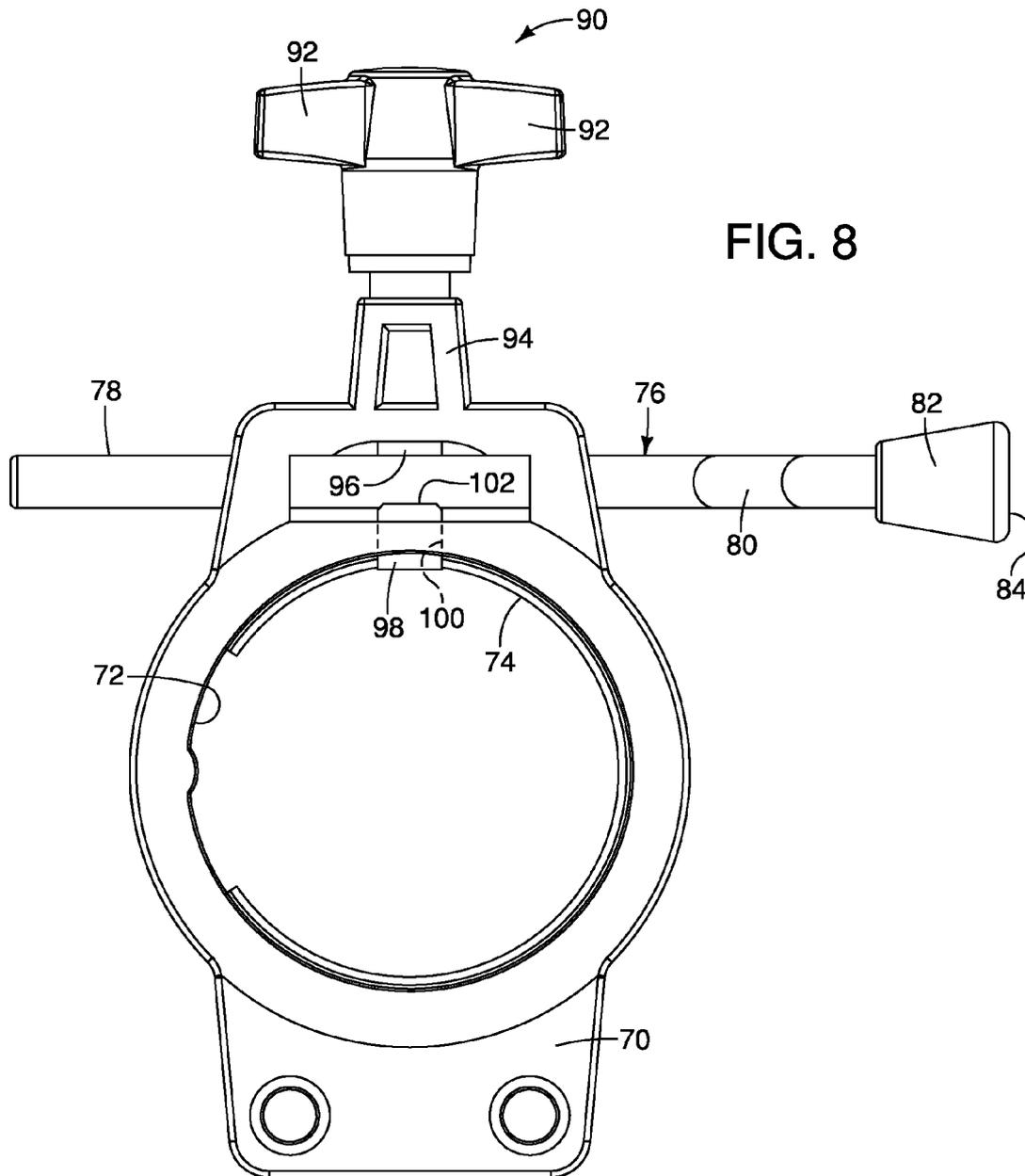


FIG. 7



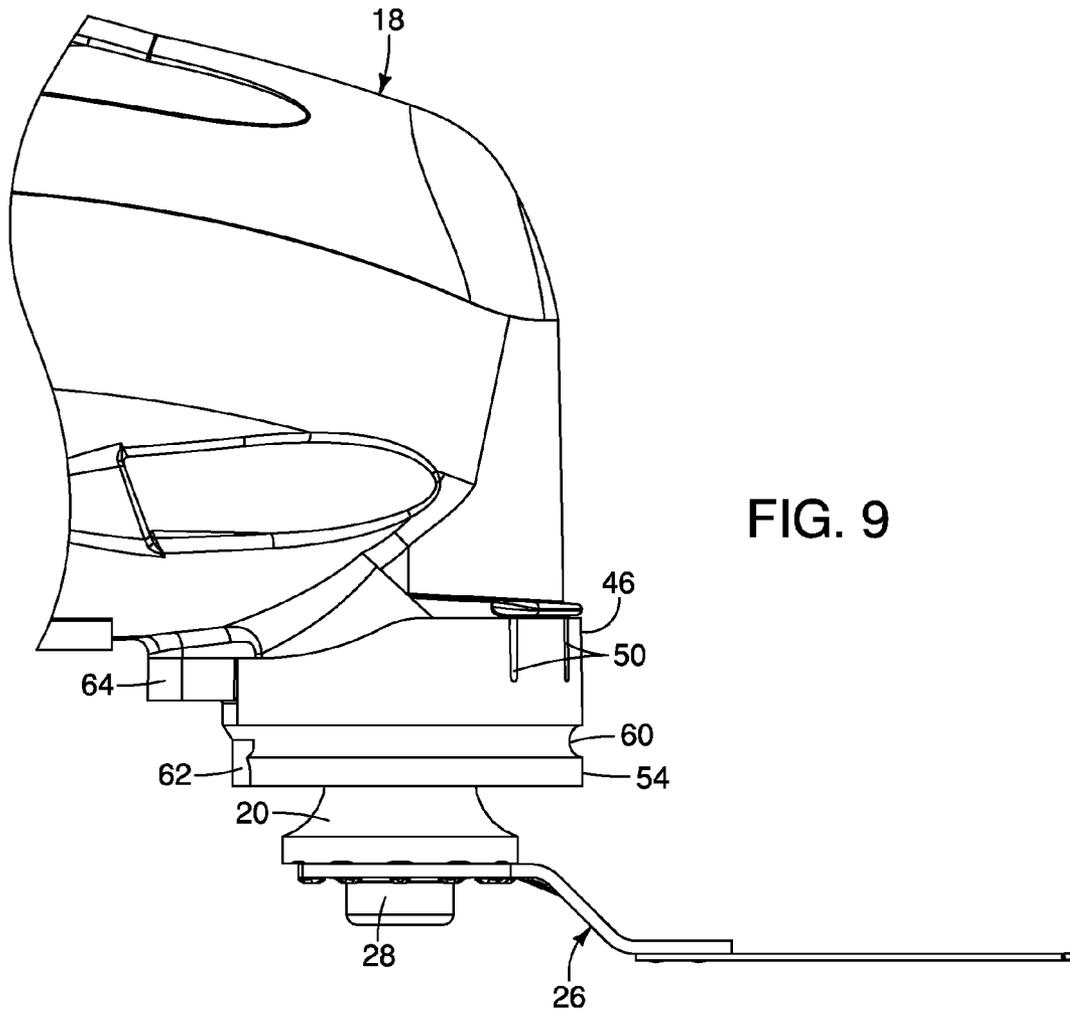


FIG. 9

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## ACCESSORY ATTACHMENT SYSTEM FOR AN OSCILLATING POWER TOOL

This application claims the benefit of U.S. application Ser. No. 12/569,619 filed Sep. 29, 2009, now U.S. Pat. No. 8,365,419 which issued on Feb. 5, 2013, the entire contents of which is herein incorporated by reference.

### BACKGROUND OF THE INVENTION

The present invention is generally related to portable hand-held power tools, and more particularly to accessory attachments for such tools.

Professional artisans, hobbyists and do-it-yourselfers have a relatively new type of power tool for performing cutting, grinding, sanding, scraping and grout removal tasks that are necessary for various repair, remodeling, or restoration projects. The power tool a relatively small handheld tool with an output shaft that moves from side to side through a small arc of about 2 to 3 degrees in an oscillating manner at a high frequency of up to 20,000 or more oscillations per minute. Various tool cutting and scraping blades and sanding attachments can be mounted on the tool. The high frequency side-to-side action optimizes control and provides safe operation, high precision and produces minimal dust. Such a tool is marketed as the Dremel® Multi-Max™ oscillating tool.

### SUMMARY OF THE INVENTION

Embodiments of the present invention comprise an accessory attachment system for a power tool having an elongated housing with a nose portion, an output shaft to which a cutting blade that oscillates through a small angle is attached, the orientation of the oscillating blade being generally perpendicular to the output shaft, the attachment comprising, an accessory interface removably mounted to the nose portion of the housing and having a central opening through which the output shaft extends, and a depth guide attachment removably mounted to the accessory interface, and being adjustably rotatable about an axis generally concentric with the output shaft, the depth guide attachment further comprising a relatively thin body portion having a generally circular first opening with a center axis generally parallel to the output shaft, the body portion being configured and sized so that the circular opening fits on the accessory interface and is rotatable thereon and having a second circular opening transverse to the first opening center axis, a depth guide member having an elongated cylindrical mounting portion, a transition portion and an outer end portion, the outer end portion being offset relative to the mounting portion so that the end portion can be adjusted relative to the oscillating blade, and a locking member configured to secure the depth guide member in a desired position.

### DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front left perspective view of a hand held power tool of the type which has an oscillating output shaft with an attached cutting blade, and which includes a preferred embodiment of the accessory attachment system of the present invention;

FIG. 2 is a front left perspective view of an accessory interface portion of the accessory attachment system mounted to the power tool shown in FIG. 1 and also including an oscillating saw blade mounted to the tool;

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FIG. 3 is a bottom left perspective view of the accessory interface mounted to the power tool shown in FIG. 1 and also including an oscillating saw blade mounted to the tool;

FIG. 4 is a top view of the power tool with the accessory attachment system shown in FIG. 1;

FIG. 5 is a left plan view of the power tool with the accessory attachment system shown in FIG. 1;

FIG. 6 is a front plan view of the power tool with the accessory attachment system shown in FIG. 1;

FIG. 7 is a front left perspective view similar to FIG. 1, but illustrating the saw blade as well as a depth guide rotated approximately 90° relative to an accessory interface and housing of the power tool;

FIG. 8 is a top view of a portion of the depth guide showing a locking mechanism for locking the body of the depth guide to the accessory interface as well as locking the depth guide member in a desired position; and

FIG. 9 is a side plan view of a portion of the power tool and accessory interface.

### DETAILED DESCRIPTION

Embodiments of the present invention are directed to an accessory attachment system for use with hand held power tools of the type which have an output shaft that moves in an oscillating manner through a small arc of approximately 2-3° at a high frequency that can extend from less than 10000 oscillations per minute to more than 20000 oscillations per minute. Such tools are marketed by Robert Bosch LLC under the Dremel® brand as the Multi-Max™ oscillating tool and such a tool is shown in the drawings of the present invention. It should be understood that the accessory attachment system, while particularly designed and configured for use with this type of tool, can be configured for use with other types of power tools, if desired.

Turning now to the drawings, and particularly FIG. 1, an oscillating power tool, indicated generally at 10 in FIGS. 1 and 3, has a generally elongated housing 12 with a longitudinal axis. The tool is configured to be held in one hand of a user and has an on/off operating switch 14 for controlling the operation of a motor located in the housing. A separate speed control switch may be provided for varying the oscillating frequency of the output shaft 16 which is shown in FIG. 3, among other views. The power tool 10 has a nose portion, indicated generally at 18, which extends generally at right angles to the longitudinal axis of the housing 12. A mounting interface 20 is secured to the output shaft 16, which interface 20 includes a number of spaced apart pins 22 configured in a circular pattern to accept and hold a mounting portion 24 of a saw blade, indicated generally at 26. The mounting portion 24 has a number of apertures configured to engage the pins 22 at various angular orientations as desired. As shown in FIGS. 1-6, the blade is oriented to extend in the direction of the longitudinal axis of the housing 12, whereas FIG. 7 shows the blade 24 rotated approximately 90° relative to the longitudinal axis of the housing 12. The mounting portion 24 is secured to the mounting interface 20 by a cap nut 28 that is shown to have a hexagonal recess 30 which can be tightened by a user to firmly hold the blade in place using a suitable Allen wrench or the like.

A preferred embodiment of the complete accessory attachment system is indicated generally at 40 in FIGS. 1, 4-8 and includes an accessory interface, indicated generally at 42 as well as a depth guide attachment, indicated generally at 44.

The accessory interface 42 is shown in detail in FIGS. 2, 3 and 9 and it is shown to have a generally cylindrical relatively thin walled inner cylindrical portion 46 which fits around the

outer cylindrical surface **48** of the nose portion **18** of the tool. The inner end portion **46** of the accessory interface **22** has a number of transverse slits **50** which extend from an inner end surface **52** outwardly to an outer cylindrical portion **54** which has an end flange portion **56** which defines an opening **58** through which the output shaft **16** and mounting interface **20** extend.

The outer end portion **54** has an annular groove **60** that extends substantially around the entire circumference of the outer end portion **54** and interacts with the depth guide attachment **44** enabling the depth guide attachment to be rotationally positioned on the accessory interface **42** to best cooperate with the angular position of the blade **26**. The rear surface of the outer end portion **54** has a reduced diameter recess **62** which is provided to facilitate attachment and removal of the depth guide attachment **44** from the interface **42**. As shown in FIG. 3, the recess **62** has a reduced diameter or depth that is generally coextensive with the deepest, i.e., the center of the groove **60** as is best shown in FIG. 9.

As is also best shown in FIG. 9, the outer end portion **54** between the end flange portion **56** and the groove **60** is slightly tapered and of reduced diameter to cooperate with the depth guide attachment **44** enabling it to be snap fitted on and relatively easily removed from the accessory interface **42**. The accessory interface **42** is preferably made of a plastic material or a plastic-like material that has some resilience, although it may be made of metal such as aluminum or steel if desired. The thin walled inner end portion **46** contains the slits **50** for the purpose of providing increased flexibility so that the accessory interface **42** can be snap fitted onto the cylindrical portion **48** of the nose portion **18**. Once it is snap fitted into place, the outer end portion **54** has a relatively substantial outwardly extending tab **64** that has an aperture **66** sized to receive a screw or the like that can be threaded into an opening (not shown) in the nose portion **18** to firmly hold the accessory interface **42** in place.

With regard to the depth guide attachment **44** and referring to FIGS. 1 and 4-8, it comprises a relatively thin body portion **70** that has a central opening **72** in which a raised rib **74** is located that extends around a substantial portion of the central opening **72** of the body **70** as shown in FIG. 8. The rib **74** engages the groove **60** of the accessory interface **42** in a manner which enables the body **70** to rotate relative to the accessory interface **42**.

The depth guide attachment **44** also comprises a depth guide member, indicated generally at **76**, which includes an elongated cylindrical mounting portion **78**, a transition portion **80**, and an outer end portion **82** which is in the shape of a truncated conical volume having a relatively flat end surface **84**. The mounting portion **78** and transition portion **80** is made of generally cylindrical aluminum stock or other metallic stock and has a relatively small diameter of 1/4 inch or less. It is sized to be sufficiently strong that it will not be easily bent, and is preferably made of cylindrical stock so that it can be rotated in a suitable aperture of the body **70**. Moreover, it is preferably slidable therein so that the position of the end surface **84** relative to the blade can be adjusted to control the depth of cut that is being achieved by the blade **26** during operation of the power tool **10**.

The transition portion **80** is provided so that rotation of the depth guide member **76** about the axis of the mounting portion **78** can be made to vary the position the end surface **84** appropriately on a work piece or work surface that is being cut. In this regard, transition portion **80** is preferably angled within the range of about 30 to about 50 degrees relative to said cylindrical mounting portion **78**. It should be understood that the outer end portion **82** can be made of a relatively hard

but somewhat resilient material such as rubber or the like so that it will not scratch or mar a surface of material that is being cut.

Once the depth guide member **76** is adjusted to its desired position by sliding and rotating the member relative to the body **70**, it can be locked in place by a locking mechanism, indicated generally at **90**. The locking mechanism generally comprises a locking knob **92** with a threaded rod portion that threadably engages a nut positioned in the body **70** or the like (not shown), but which is located in a portion **94** of the body **70**. The knob **92** has a rod end portion **96** that contacts an outer surface of the cylindrical mounting portion **78**. Tightening rotation of the knob **92** will cause the threaded portion to be moved inwardly toward the cylindrical mounting portion of the depth guide member to lock the same. Thus, the depth guide member will be locked in place depending upon the amount of force that is applied by rotating the knob **92**.

It should also be understood that the locking mechanism **90** not only locks the depth guide member in place, but also locks the body **70** so that it will not rotate relative to the accessory interface **42**. This is achieved by a transfer member **98** which preferably consists of a preferably cylindrical member **98** that fits within an aperture **100** in the body **70** and has a length sufficient so that when the locking mechanism **90** is tightened, the transfer member **98** will be brought into contact with the accessory interface **42** to lock the body **70** in place and prohibit it from being rotated. An opposite end **102** of the transfer member **98** may be appropriately curved to fit around a portion of the circumference of the cylindrical mounting portion **78** as shown in FIG. 8.

The thickness of the body portion **70** is preferably minimized, but is slightly larger than the diameter of the cylindrical mounting portion **78** and may be 1/2 inch or less. This contributes to the ease of use and unobtrusiveness of the depth guide attachment **44**. Because of its compact design, it can be mounted onto the accessory interface **42** as well as removed from it without removing the blade **26**.

While various embodiments of the present invention have been shown and described, it should be understood that other modifications, substitutions and alternatives are apparent to one of ordinary skill in the art. Such modifications, substitutions and alternatives can be made without departing from the spirit and scope of the invention, which should be determined from the appended claims.

Various features of the invention are set forth in the following claims.

What is claimed is:

1. A depth guide attachment for an oscillating power tool, comprising:

a body portion configured to be supported by a nose portion of an oscillating power tool and rotatable with respect to the nose portion about a central axis of a central aperture of the body portion;

a depth guide member including a generally cylindrical mounting portion and an outer end portion, the mounting portion rotatably supported by the body portion and extending along a longitudinal axis from a front portion of the body portion in a direction transverse to the central axis, the outer end portion including an end surface configured to contact a work surface to control a depth of cut;

a locking mechanism configured to exert force perpendicular to both the central and longitudinal axes to secure the mounting portion in a desired rotational position in relation to the body portion and capable of locking the body portion to the nose portion of the oscillating tool; and

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a transfer member operably connected to the locking mechanism and to the mounting portion such that when the locking mechanism exerts the force the mounting portion transfers the force to the transfer member thereby capable of pressing the transfer member against the nose portion of the oscillating tool. 5

2. The attachment of claim 1, wherein the mounting portion is slidably supported by the body portion to adjust a distance of the outer end portion of the depth guide member in relation to the front portion of the body portion. 10

3. The attachment of claim 2, wherein the body portion includes a second circular opening oriented perpendicular to the central axis in which the mounting portion of the depth guide member is rotatably and slidably received.

4. The attachment of claim 3, wherein the body portion has a thickness dimension perpendicular to the second circular opening that is slightly larger than a diameter of the second circular opening. 15

5. The attachment of claim 1, wherein the depth guide member includes a transition portion between the mounting portion and the outer end portion, the transition portion offsetting the outer end portion from a rotational axis of the mounting portion thereby establishing a first depth of cut along the central axis. 20

6. The attachment of claim 5, wherein the mounting portion is longitudinally slidable with respect to the body portion, thereby establishing a second depth of cut along the longitudinal axis. 25

7. The attachment of claim 6, wherein the locking mechanism comprises:

a rod configured to operably contact the mounting portion; and

the transfer member is configured to operably contact the mounting portion, such that the mounting portion is rotationally and slidably lockable between the rod and the transfer member. 35

8. The attachment of claim 7, wherein the transfer member is movable toward the central axis within an aperture extending through the body portion.

9. The attachment of claim 8, further comprising:

a threaded member fixedly positioned with respect to the body portion and engaged with a threaded portion of the rod. 40

10. A depth guide attachment for an oscillating power tool, comprising:

a body portion configured to be supported by an oscillating power tool and rotatable with respect to a nose portion of the oscillating power tool about a central axis of a central aperture of the body portion; and

a depth guide member including (i) a generally cylindrical mounting portion rotatably supported by the body portion and extending along a longitudinal axis from a front portion of the body portion in a direction transverse to the central axis, (ii) an outer end portion including a guide surface configured to contact a work surface, and 50

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(iii) a transition portion between the mounting portion and the outer end portion, the transition portion offsetting the outer end portion from a rotational axis of the mounting portion, such that a first depth of cut along the central axis is established by locking the mounting portion at an associated rotational position of the mounting portion;

a locking mechanism configured to exert a force perpendicular to both the central and longitudinal axes to secure the mounting portion at a desired rotational position in relation to the body portion and capable of locking the body portion to the nose portion of the oscillating tool; and

a transfer member operably connected to the locking mechanism and to the mounting portion such that when the locking mechanism exerts the force the mounting portion transfers the force to the transfer member thereby capable of pressing the transfer member against the nose portion of the oscillating tool.

11. The attachment of claim 10, wherein: the mounting portion is longitudinally slidable with respect to the body portion; and

a second depth of cut along the longitudinal axis is established by longitudinally locking the mounting portion.

12. The attachment of claim 10, wherein the locking mechanism is further configured to secure the body portion at a desired longitudinal position.

13. The attachment of claim 12, wherein the locking mechanism comprises:

a rod configured to operably contact the mounting portion; and

the transfer member is configured to operably contact the mounting portion, such that the mounting portion is rotationally and slidably lockable between the rod and the transfer member. 35

14. The attachment of claim 13, wherein the transfer member is movable toward the central axis within an aperture extending through the body portion.

15. The attachment of claim 14, further comprising:

a threaded member fixedly positioned with respect to the body portion and engaged with a threaded portion of the rod. 40

16. The attachment of claim 10, wherein the locking mechanism comprises:

a rod configured to operably contact the mounting portion; and

the transfer member is configured to operably contact the mounting portion, such that the mounting portion is rotationally lockable between the rod and the transfer member. 45

17. The attachment of claim 16 wherein the transfer member is movable toward the central axis within an aperture extending through the body portion.

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